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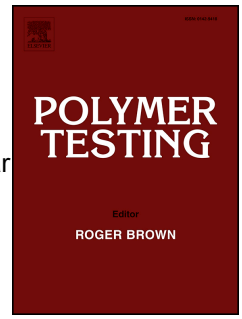

The ballistic performance of aramid based fabrics impregnated with multi-phase shear thickening fluids

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The ballistic performance of aramid based fabrics impregnated with multi-phase shear thickening fluids

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Abstract

Single-phase shear thickening fluids (STFs) have been extensively investigated in body protective applications. However, researchers do not have long-standing past experience of multi-phase STFs in protection. In the present work, multi-phase STFs were fabricated adding different amount of silicon carbide (SiC) additives into silica and polyethylene glycol (PEG) based suspensions. The thickening rheology of multi-phase STFs was investigated through rheological measurements. Ballistic impacts on multi-phase STF treated fabrics were carried out using lead core bullets with the impact speed of ~330 m/s. Based on the results, multi-phase STFs improve the ballistic performance of high performance fabrics in comparison to single-phase STFs however, the mass efficiency of fabrics has a loss of performance for high velocity impact conditions.

Keywords: Ballistic; high performance fabric, shear thickening fluid, carbide particles, impact.